REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

I. Disposition of Claims

Claims 1-21 are pending in this application. Claims 1, 8, 12, 15, 17, and 20 are independent. The remaining claims depend, directly or indirectly, from claims 1, 8, 12, 15, 17, and 20.

II. Objections

A. Specification

The specification was objected to for the use of bold type and underlined type in titles for the sections in the specification. The section titles have been amended to be capital letters without bold or underline.

The specification was objected to for the use of "voice" instead of "speech" in reference to speech-recognition technology. Instances of "voice recognition" have been replaced with "speech recognition" as suggested by the Examiner. The amendments have been incorporated into the attached substitute specification. A clean version and marked-up version of the specification showing all changes are enclosed. These changes were made to comply with the terminology suggested by the Examiner. Accordingly, none of the changes made to the specification constitute new matter. Applicant respectfully requests withdrawal of the objection to the specification.

B. Title

The title was objected to as not being descriptive. The title has been amended as suggested by the Examiner to be: "GENERAL REMOTE CONTROL USING SPOKEN COMMANDS." Accordingly, withdrawal of the objection to the title is respectfully requested.

C. Drawings

Figure 1 was objected to for lacking a descriptive legend. Figure 1 has been amended to include descriptive terms for each element in the drawing. Figures 2A, 2C, and 4 were objected to for containing the "voice" terminology. Figures 2A, 2C, and 4 have been amended to refer to "speech" as required by the Examiner. The changes made to the drawings were made only to comply with the Examiner's objections and do not change the meaning of the drawings, nor do the changes made to the drawings constitute new matter. Accordingly, withdrawal of the objection to the figures is respectfully requested.

D. Claims

Claims 5, 7, and 8-14 were objected to for containing "voice recognition." Claims 5, 8, and 12 have been amended to refer to "speech recognition." The objections to claims 7, 9-11, 13, and 14 are overcome because claims 7, 9-11, 13, and 14 depend from claims 5, 8, and 12. These amendments were made only to be consistent with the specification and to comply with the terminology suggested by the Examiner. No new matter has been added in these amendments. These amendments to claims were not made to overcome any prior art. Withdrawal of the objection to the claims is respectfully

requested.

III. Rejections under 35 U.S.C § 102

Claims 1-11 and 15-19 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,606,280 issued to Knittel. Claims 1, 5, 8, 15, and 17 have been amended in this reply to clarify the present invention. Independent claims 1, 8, 12, 15, 17, and 20 and dependent claim 5 were amended to clearly refer to "nontrivial" voice commands. The Background section discusses the differences between trivial and nontrivial voice commands. Paragraph [0021] clearly states that the invention relates to nontrivial speech recognition. Thus, these amendments are fully supported and do not constitute new matter. Claim 15 was amended to include a user interface for validating commands as recited in claim 16, which has been canceled. Claim 17 has been amended to include validating the command signal as recited in claim 18, which has been canceled. The amendments to claims 15 and 17 do not constitute new matter. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

Amended claims 1, 8, 15, and 17 are independent. Each of the amended claims refers to speech recognition of nontrivial voice commands. The term "nontrivial speech recognition" is distinguishable from "trivial speech recognition." (page 1, paragraph [0004]) Trivial speech recognition refers to matching speech patterns "with a stored set of commands." In contrast, nontrivial speech recognition may include "analyzing a voice to recognize parts of speech, grammar, word meaning, and context." As amended, claims 1, 8, 15, and 17 clearly refer to nontrivial speech recognition of spoken commands.

Knittel discloses a remote control using trivial speech recognition as described in the Background of the present application. Knittel specifically discusses the complexity of commands that the system is capable of learning. (column 11, lines 31-49) Knittel requires that each command be learned and separately stored. The preferred devices of Knittel will use a vocabulary that is on the order of a hundred words. The commands include "volume up" and specific channels. When a voice command is received, it is "matched against a table of stored codes." (column 11, lines 40-46) The storage and matching of voice signals disclosed by Knittel is consistent with trivial speech recognition discussed in the Background of the present application. Knittel neither shows nor suggests nontrivial speech recognition as disclosed in the present invention.

Claim 15 has been further amended to include a user interface for validating a command signal. The method of claim 17 was similarly amended to include validating a command signal. The Examiner asserts that validation of command signals is disclosed by Knittel. The Applicant respectfully disagrees and notes that Knittel merely provides a signal that the remote control failed to recognize a voice command. (column 12, lines 40-43) This recognition of unrecognizable voice commands is not a user interface for validating a command signal. Validation of a command involves a user acknowledging or validating the command before it is transmitted to the device. (page 8, paragraph [0028]) For example, a user may view a display on the remote control that shows the recognized command or sequence of commands. If the user considers the command to be correct, the command may be transmitted after a lapsed time, or alternatively, the user may press a button to accept the command. If the user determines that the command is incorrect, the user may perform some action, such as pressing a button or saying "no," to

cancel the command. After declining the command, the user may speak the command again.

For example, a user may say, "Record channel 28 from 8:30 p.m. until 9:00 p.m." After processing, the remote control may show that it will record channel 24 at that time because the user spoke too quickly for the speech recognition. The user would see this mistake, and cancel the command. If the channel was correctly shown as channel 28, the user would accept the command. This level of validation is distinguishable from merely beeping to signal that a command was not understood, as shown in Knittel.

In view of the above, Dietzen fails to show or suggest the present invention as recited in the claims as amended. Thus, amended claims 1, 8, 15, and 17 are patentable over Knittel. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

IV. Rejections under 35 U.S.C § 103

Claims 12-14, 20, and 21 were rejected under 35 U.S.C. § 103 as being obvious over Knittel. Claims 12 and 20 have been amended in this reply to clarify the present invention. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

As discussed with respect to amended claims 1, 8, 15, and 17, Knittel fails to show or suggest nontrivial speech recognition as claimed. Claims 12 and 20 have been similarly amended to clearly claim nontrivial speech recognition. Thus, amended claims 12 and 20 are allowable for at least the same reasons as amended claim 1, 8, 15, and 17.

In view of the above, Knittel fails to show or suggest the present invention as

recited in the claims as amended. Thus, amended claims 12 and 20 are patentable over Knittel. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

V. Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 03226/090001).

Respectfully submitted,

Date: 6/8/04

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APPLICATION

FOR

UNITED STATES LETTERS PATENT

TITLE: GENERAL REMOTE ~~TRANSLATOR~~ USING SPOKEN COMMANDS

APPLICANT: Daniel Luchaup

"EXPRESS MAIL" Mailing Label Number: _____

Date of Deposit: _____

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JUN 08 2004
PATENT & TRADEMARK OFFICE 2600

GENERAL REMOTE ~~TRANSLATOR~~ USING SPOKEN COMMANDS

RECEIVED
JUN 16 2004
Technology Center 2600

BACKGROUND OF INVENTION

Field of the Invention

[0001] The present invention relates generally to ~~voice~~speech-recognition devices.

Background Art

[0002] The use of speech-recognition (or voice-recognition) technology is becoming a viable means to control one's environment. As the sophistication of the speech-recognition technology increases and the cost of the equipment decreases, the use of speech-activated devices will become commonplace. Applications for speech recognition technology are numerous. Obvious examples include the control of appliances, consumer electronics, toys, and tools. Speech recognition technology is most useful when the hands and/or eyes are busy or useless, e.g., while driving or in a dark room. Furthermore, speech recognition technology can be a big help for people with physical impairments.

[0003] Speech recognition technology has been under development for several decades. This development has resulted in a variety of hardware and software tools for personal computers. ~~Voice~~Speech-recognition systems used to require specialized circuit boards (i.e., those with digital signal processors (DSPs)) and software. With the development of more powerful and sophisticated computer hardware, the need for specialized circuit boards has disappeared. Currently, most ~~voice~~speech-recognition software can take advantage of the generally available computer hardware.

[0004] ~~Voice~~Speech-recognition technology comes in two flavors: finite command recognition (trivial ~~voice~~speech recognition) and true dictation recognition (nontrivial ~~voice~~speech recognition). The trivial ~~voice~~speech recognition simply matches the speech pattern of a spoken command with a stored set of known commands. This type of ~~voice~~speech recognition is relatively straightforward and does not require costly and bulky equipment or software. In contrast, the nontrivial ~~voice~~speech recognition can

analyze the ~~voice~~speech to recognize parts of speech, grammar, word meaning, and context. This type of ~~voice~~speech recognition requires relatively expensive hardware and software. The hardware for nontrivial ~~voice~~speech recognition tends to be bulky and cannot be incorporated into small devices.

[0005] The nontrivial ~~voice~~speech-recognition technology can be further subdivided into two categories: discrete and continuous ~~voice~~speech recognition. In discrete ~~voice~~speech recognition, each spoken word must be separated by a brief pause (usually a few tenths of a second) so that the computer may distinguish the beginning and ending of words. In contrast, continuous ~~voice~~speech recognition requires no pauses between the words and can process words spoken in a normal speech. The degree of sophistication of a continuous speech recognition system is often determined by the size of its vocabulary.

[0006] Speech recognition tools also can be classified into speaker-dependent and speaker-independent categories. The speaker dependent tools require a user to participate in extensive training exercises to drill the system to recognize the user's ~~voice~~speech profile. The machine will then respond to the specific user. After such training, the accuracy of speech recognition is usually respectable. With a speaker independent system, on the other hand, no training of the system is required; any user can begin to use the machine, which will then attempt to adapt ("train") itself to the ~~voice~~speech profile of the user. With the speaker independent system, the initial accuracy rate for ~~voice~~speech recognition is less desirable, but it increases with use.

[0007] The choice of which type of ~~voice~~speech-recognition applications to use is often dictated by the resources required. The cost of nontrivial speech-recognition tools has come down significantly in recent years. However, it is typically still too expensive to be deployed in remote controls for appliances such as household appliances and consumer electronics (herein, "appliance" will be used as a general term to refer to all types of electrical appliances and consumer electronics used in households or vehicles). In addition, the hardware required for nontrivial applications tends to be too bulky to be incorporated into small consumer products. In contrast, remote controls using other technologies (e.g., push buttons plus infrared or radio frequency tramsmitters) are more

affordable. Consequently, they are widely used for controlling consumer electronics and appliances.

[0008] U.S. Patent No. 6,119,088, issued to Ciluffo, discloses a voice-activated remote control that uses the trivial command recognition technology and allows for only dozens of preprogrammed voice commands. U.S. Patent No. 6,188,986 B1 issued to Matulich et al., discloses a voice-activated device that controls a household electrical switch or an AC circuit. The Matulich device also uses the trivial ~~voice~~speech-recognition technology. Thus, there exists a need to have remote controls that can respond to more sophisticated voice commands such as "VCR, tape the program from 8 to 9 PM and from 10 to 11 PM tonight." This type of sophisticated command will require nontrivial, continuous ~~voice~~speech-recognition technology.

SUMMARY OF INVENTION

[0009] One aspect of the present invention relates to voice-translating remote controls for appliances, such as stereos, video cassette recorders (VCR), televisions (TV), coffee makers, microwave ovens, and lights. As a result, the remote control acts as a translator from voice (analog) to remote control commands (digital). One embodiment of the invention comprises a voice-translating remote control that includes a microphone and an audio input transmitter. The microphone receives voice input from a user, thereby outputting a voice signal. The audio transmitter transmits an audio input signal based on the voice signal to a host system, which includes a ~~voice~~speech-recognition processor. After the host system has processed the audio input signal, it transmits a control signal directly to an appliance.

[0010] In another embodiment, the voice-translating remote control further comprises a signal receiver and a signal transmitter, which are operably connected. In this embodiment, the host system, after processing the audio input signal, transmits a command signal to the signal receiver in the remote control. The signal transmitter in the remote control then transmits a control signal based on the command signal to an appliance.

[0011] Another aspect of the invention relates to a system for voice-activated control of an appliance. The system comprises a host system and a remote control. The host system comprises a host receiver, a ~~voice~~speech-recognition processor, and a host transmitter. The remote control comprises a microphone to receive voice command and to output a voice signal. An audio input signal based on the voice signal is transmitted by a suitable transmitter (e.g., an audio transmitter) in the remote control to the host system. The audio input signal received by the host system is processed by the ~~voice~~speech-recognition processor to generate a command signal which is then transmitted either directly to the appliance or to the remote control which then transmits a control signal based on the command signal to an appliance.

[0012] In yet another aspect, embodiments of the invention relate to methods for controlling an appliance by voice command. The method comprises receiving a voice command by the remote control to output a voice signal, transmitting an audio input signal based on the voice signal by an audio transmitter in the remote control to the host system, processing the audio input signal by the ~~voice~~speech-recognition processor in the host system to generate a command signal, and transmitting the command signal to an appliance or to the remote control which then retransmits a control signal based on the command signal to an appliance. The remote control may require user interaction/acknowledgment before forwarding the command signal to an appliance.

[0013] One advantage of the invention is that the voice-translating remote controls of the present invention may use the traditional, affordable infrared or RF technology, but provide the convenience and flexibility afforded by ~~voice~~speech-recognition technology. By using a host system to handle speech-recognition, there is no need to duplicate the expensive resources for each control for the appliances and consumer electronic devices. Furthermore, by having a separate host system to process the ~~voice~~speech recognition, the system is highly customizable. The programs for translation or ~~voice~~speech recognition can easily be updated or changed, and the host has to "learn" only once the characteristics of a user's voice, appliance identification information, etc. Similarly, when updating a user's voice (when adding or changing a user) or appliance identification information, it is much simpler to update a host system than to update each

remote control. Other advantages of the present invention will become apparent with the following discussion.

BRIEF DESCRIPTION OF DRAWINGS

[0014] FIG. 1 is a schematic diagram of one embodiment of a voice-translating remote control system of the present invention.

[0015] FIG. 2 is a schematic diagram of one embodiment of a voice-translating remote control of the present invention.

[0016] FIG. 2A is a schematic diagram of another embodiment of a voice-translating remote control of the present invention.

[0017] FIG. 2B is a schematic diagram of another embodiment of a voice-translating remote control of the present invention.

[0018] FIG. 2C is a schematic diagram of another embodiment of a voice-translating remote control of the present invention.

[0019] FIG. 3 is a schematic diagram of one embodiment of a ~~voice~~speech-recognition processor of the present invention.

[0020] FIG. 4 is a flow chart of the steps involved in some embodiments of a voice-translating remote control system of the present invention.

DETAILED DESCRIPTION

[0021] The invention relates to use of the nontrivial ~~voice~~speech-recognition resources in a way that is affordable such that they can be used to control various electronic and electrical devices such as those found in homes, automobiles, boats, etc. Embodiments of the present invention employ a nontrivial ~~voice~~speech-recognition resource centralized in a machine separate from the remote control units so that the expensive ~~voice~~speech-recognition resources need not be duplicated for each remote control and/or appliance. Using the ~~voice~~speech-recognition resources in the host system, the remote controls behave as a general remote translator (GRT), which can translate relatively sophisticated

voice command into a proper control signal for any specific appliance. These remote controls may be generally referred to as "voice-translating remote controls."

[0022] FIG. 1 illustrates a schematic diagram of one embodiment of the present invention. A user **11** utters a voice command **21**, which is not limited to the preprogrammed short command words, to a remote control **10**. "Remote control" is generally used herein to refer to a device for controlling an appliance; it may look like, but is not identical to, a *conventional* remote control. In some embodiments, the remote control **10** may include a user interface (which may include an LCD display) and may look like a cellular phone or a personal digital assistant (e.g., a Palm Pilot™ from Palm, Inc., of Santa Clara, California). Embodiments of the invention can also be used in an embedded system. For example, a device equivalent to the remote control **10** may be installed in a car to allow a driver to talk commands.

[0023] An audio input signal **25** is derived from the voice command **21** and transmitted to a host receiver **51** on a remote host system **50**. The host system **50**, which can be a dedicated unit or part of a general use computer, includes the host receiver **51**, a ~~voice~~speech-recognition processor **52**, and a host transmitter **53**. The ~~voice~~speech-recognition processor **52** includes the necessary hardware and software for processing the ~~voice~~speech recognition.

[0024] The audio input signal **25** received by the host receiver **51** is processed by the ~~voice~~speech-recognition processor **52** to generate a command signal **35**, which is transmitted by the host transmitter **53** to the remote control **10**. The command signal **35** could include information such as the identity of the appliance **60** to be controlled and the command to be sent to the appliance **60**. In this case, the identity of appliance **60** is extracted from the audio input signal **25** by the ~~voice~~speech-recognition processor **52**, which has in its memory (not shown) such identification information and the correct carrier frequency or pulse pattern (IR or RF) to control this particular appliance. In one embodiment, such appliance identification information and corresponding unique frequencies or pulse patterns could be remotely updated periodically from a database server connected to the Internet.

[0025] Alternatively, the command signal **35** may not include the appliance **60** identification information. Instead, a user may perform some act (e.g., pressing a button or a combination of buttons) on the remote control **10** to identify the appliance **60** to be controlled. In yet another embodiment, shown in FIG. 2A, the remote control may include a trivial ~~voice~~speech-recognition processor **15**, which extracts the appliance identification information from the voice signal **26**. The appliance identification information (or unique frequency or pulse pattern) may be sent to the audio transmitter **20** to be included in the audio input signal **25** sent to the host system **50**. Alternatively, this identification information may be used by the remote control **10** to generate a proper frequency or pulse pattern to encode the control signal **16** sent to the appliance **60**.

[0026] The host system **50** may be a dedicated machine (an appliance) or part of a computer. It can be situated on the premises where the appliance **60** is located or it can be in a remote location so long as the remote control **10** (GRT) can communicate with the host system **50**. Such communication, i.e., the transmission of the audio input signal **25** and the command signal **35** to and from the host system, can be accomplished either by wireless (e.g., radio frequency, microwave, or infrared communication) or wired (e.g., household wiring, local area network, wide area network, or internet) means. The wireless communication means is preferred for sake of mobility. The host system **50** does not have to be housed in one physical unit. For example, the host receiver **51** and the host transmitter **53** might be housed in separate units from that housing the ~~voice~~speech-recognition processor **52**. If these units are housed in different physical units, they should be in communication via a wireless or wired means; preferably a wired means.

[0027] The command signal **35** received by the remote control **10** is transmitted as a control signal **16** to the appliance to be controlled **60**. The transmission of the control signal **16** can be accomplished by any of the wireless communication means such as infrared (IR) or radio frequency (RF). The type of the communication means will be determined by the receiver (not shown) on the appliance **60**. In some embodiments of the present invention, the receiver on the appliance **60** is that currently in use such that no modification need be made to the receiver. For those appliances currently without

receivers (e.g., lights, microwave ovens, coffee makers, etc.), it is preferred that they will be equipped with these general use, low-cost receivers (e.g., IR or RF receivers) in order to take advantage of the present invention.

[0028] Alternatively, after the command signal **35** is received by the remote control **10**, there is an additional step of acknowledgment or validation before a control signal **16** is sent to the appliance **60**. The acknowledgment or validation step will allow a user to correct errors arising from ~~voice~~speech-recognition or abort the command. In such an embodiment, the remote control **10** comprises a user interface to permit display of message associated with the command signal **35**. Such a display may be an LCD display as that used in a cellular phone or a personal digital assistant (e.g., a Palm Pilot™ from Palm, Inc. of Santa Clara, California).

[0029] One skilled in the art will appreciate that the embodiment of FIG. 1 is for illustration only and variations of this embodiment are possible. For example, the command signal **35** generated by the ~~voice~~speech-recognition processor **52** can be transmitted directly to the appliance **60**. In such an embodiment, the command signal **35** will be in a format compatible with the common IR or RF receiver found on the appliance **60** and the remote control **10** will not need the second receiver (**30** in FIG. 2) and the second transmitter (**14** in FIG. 2).

[0030] FIG. 2 illustrates key components of the remote control **10**. The remote control **10** includes a first receiver **12** (also referred to as a microphone) for receiving voice commands (**21** in FIG. 1) and to output a voice signal **26**. The remote control **10** also includes a first transmitter **20** (also referred to as an audio transmitter) to transmit audio input signal **25** based on the voice signal **26** to the host system **50**. In some embodiments of the present invention, the audio input signal **25** and the voice signal **26** may be the same signal. In other embodiments, the audio input signal **25** and the voice signal **26** may have different characteristics. Further, the remote control **10** includes a second receiver **30** (a signal receiver) to receive the command signal **35** transmitted from the host system, and a second transmitter **14** (a signal transmitter) to transmit the control signal **16** to the appliance (**60** in FIG. 1). In some embodiments, the second transmitter **14** is a type

that will transmit IR or RF signals such as those commonly used with traditional remote controls. These key components constitute one embodiment of the remote control of the present invention. One skilled in the art will appreciate that many variations are possible without departing from the scope of the present invention. For example, the remote control **10** may further include amplifiers or filters for signal conditioning, or the remote control **10** may not need the second receiver **30** and the second transmitter **14** if, as discussed above, the host system directly transmits the command signal **35** to the appliance **60**.

[0031] FIG. 2A illustrates another embodiment of the remote control **10**. In this embodiment, the remote control **10** further comprises a trivial ~~voice~~speech-recognition processor **15**. The ~~voice~~speech-recognition processor **15** can extract the appliance identification information from the voice signal **26**. Once extracted, the appliance identification information can be either included in the audio input signal **25** sent by the audio transmitter **20** or sent to the signal transmitter **14** to be used to encode the control signal **16**.

[0032] FIG. 2B illustrates yet another embodiment of the remote control **10**. In this embodiment, the remote control **10** further comprises a user interface **17**, which may include a liquid crystal display (LCD) or other components (e.g., light emission diodes, LEDs) to display or indicate the contents of the command signal **35** or to indicate the correctness of the command signal **35**. A "user interface" is used herein to refer to a device (or components) that provides feedback (e.g., via LCD or LED) and allows a user to acknowledge and/or make correction, if necessary, before forwarding a command to an appliance. In this embodiment, the user has an opportunity to acknowledge or validate the command signal **35** generated by the host system before sending the control signal **16** to the appliance **60**. If there is any error in the command signal **35**, the user may have an opportunity to correct the error or to abort the operation and start over. For example, the user interface **17** may display "VCR #1, record channel 13 from 6 PM to 8 PM." Then, the user will acknowledge and send the command to the appliance (VCR #1), if this is correct. Otherwise, the user may correct the error or abort the operation by not sending the control signal **16**. Inclusion of such an acknowledgment and validating step in the

embodiments of the present invention is preferred because the reliability of ~~voice~~speech-recognition technology is not yet foolproof.

[0033] A further embodiment, which includes both a trivial ~~voice~~speech-recognition processor **15** and a user interface **17**, is illustrated in FIG. 2C. In this embodiment, the remote control **10** has both advantages disclosed in the embodiments shown in FIG. 2B and FIG. 2C. That is, the remote control **10** as shown in the embodiment of FIG. 2C is capable of both extracting the appliance identification information from the voice signal **26** and allowing the user to acknowledge or validate the command.

[0034] Again, the embodiments as shown in FIGs 2, 2A, 2B, and 2C are for illustration only. One skilled in the art, with the benefit of this disclosure, will appreciate that other variations are possible without departing from the scope of the present invention.

[0035] The ~~voice~~speech-recognition processor **52** of the host system **50** can be any of the ~~voice~~speech-recognition systems known in the art or any modification thereof. FIG. 3 illustrates one example of a ~~voice~~speech-recognition system. One skilled in the art will appreciate that other variations of the ~~voice~~speech-recognition system can be substituted without departing from the scope of the present invention.

[0036] Referring to FIG. 3, the input signal **2** received from the host receiver **51** (see FIG. 1) is amplified by an input amplifier **4.** Noise is removed from the amplified input signal by a bandpass filter **6**, before it is sent to an automatic gain control **8**, which is a feedback loop that accepts a varying input signal and uses feedback to maintain a constant output signal. The automatic gain control **8** is in constant communication with a microcontroller **40** by feeding a signal **84** to the microcontroller **40** and receiving a feedback signal **48** back from the microcontroller **40**. The microcontroller **40** maintains an ambient signal level during a preset time window by sending the feedback signals **48** to the automatic gain control circuit **8**. The ambient level is used as a starting level for recognizing speech. Any background noise received by the device during the time window that is below the ambient level is ignored. After the time window has expired, the device establishes a new ambient level. The microcontroller **40** can be a specialized

digital signal processor or a general purpose microcontroller which is configurable for a variety of applications including speech recognition.

[0037] The microcontroller circuitry includes the microcontroller **40** and a number of memory modules such as a program memory **41** and speech command memory **42**. The program memory **41** may be a Read Only Memory (ROM) module which stores the programming code of the microcontroller **40**. The programming code establishes the sequence of events that are followed by the device to produce a control signal **44** in response to valid speech commands. The control signal **44** is delivered by an output control **43** to the host transmitter **53** (see FIG. 1) for transmission to the remote control **10** (see FIG. 1). The speech command memory **42** may employ a Random Access Memory (RAM) module which stores the speech commands. The microcontroller **40** may further include RAM memory (not shown) for performing ~~voice~~speech recognition. The term "memory module" does not necessarily refer to separate circuit elements. For example, all ROM data may be stored in the same circuit element, but at different address block locations.

[0038] FIG. 4 is a flow chart illustrating how some embodiments of the present invention may operate. Before the ~~voice~~speech-recognition system processes any signal, an ambient level of signal is established in step **71**. The ambient level is then compared with the audio input signal **25** (see FIG. 1) received by the host receiver **51** (see FIG. 1) in step **72**. If the audio input signal **25** is not above the ambient level, the ~~voice~~speech-recognition system will not perform any processing and the system goes back to establish a new ambient level. If the audio input signal **25** is above the ambient level, then the audio input signal is processed in step **73** to generate a command signal **35** (see FIG. 1) in step **74**. Depending on the embodiments of the invention, the command signal **35** may be transmitted (pathway A) directly to the appliance **60** (see FIG. 1) or (pathway B) to the remote control **10** (see FIG. 1) in step **76**. If the command signal **35** is transmitted to the remote control **10** (pathway B), the command signal **35** may be used (pathway C) to generate a control signal **16** (see FIG. 2) for transmission to the appliance **60** in step **78**. Alternatively, the command signal **35** may be sent (pathway D) to a user interface **17** (see FIG. 2C) for user validation in step **77**. If the command signal is correct, the user may

send it as a control signal **16** to the appliance **60** in step **78**. If the command signal **35** has some error, the user may correct the error and then send the corrected command in the form of a control signal **16** to the appliance **60** in step **78**. Alternatively, the user may abort the operation, when the command signal includes error.

[0039] FIG. 4 illustrates examples of how some embodiments of the present invention may operate. These examples are not comprehensive; other variations are possible. For example, these systems may further include steps for signal amplification and noise filtering. One skilled in the art, having the benefit of this disclosure, will appreciate that other variations are possible without departing from the scope of the present invention.

[0040] While the invention has been described using a limited number of embodiments, those skilled in the art, having the benefit of this disclosure, will appreciate that other embodiments are possible without departing from the scope of the invention as disclosed herein. Accordingly, the scope of the invention should be limited only by the attached claims.